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**RESEARCH ARTICLE**

**Effect of different pre and post-emergent application of herbicides on the productivity of Black gram (*Vigna mungo* L.) under acidic soils of Manipur**

K.S. Shashidhar1\*, M.S. Jeberson1, N. Premaradhya2 , I. Priyanka 2 and K.S. Vinoda3

**ABSTRACT**

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An experiment on the productivity of Urd bean on acidic soils of Manipur was undertaken at the Central Agricultural University (CAU) research farm in Andro, Imphal, Manipur. In the experiment, eleven treatments were used: weedy-check, 2 hands weeding, pre-emergent, post-emergent application. Other yield features were consistent with pendimethalin 30 percent EC + Imazathapyr 2 percent EC @ 1 kg a.i. per ha (602 & 1724 kg/ha respectively). Herbicide efficiency was higher at 30 & 45 DAS, whereas weed index was lower than other treatments. The two-year study concluded that pre-emergent administration of pendimethalin (30% EC) + isazethapyr (50%) 2 percent EC @ 1 kg a.i. per ha + one hand weeding at 25-30 DAS + Imazathypr 55 g a.i. per ha is the most efficient weed control therapy in Manipur.

***Keywords:*** *Vigna mungo* L.; Pendimethalin; Imazathapyr; Hand weeding; WCE

\*Corresponding author e-mail address: shashiuas@gmail.com (K.S. Shashidhar)

**INTRODUCTION**

Urdbean enhances soil by fixing 70-90 kg/ha nitrogen (Satish et al., 2018). It contributes roughly 10% of overall production in India. It was planted on 5.4 million ha in 2016-17, yielding 3.86 million t and 655 kg/ha (Anonymous, 2018). In Manipur, the crop is cultivated on 1300 ha, yielding 1072 tonnes at 825 kg/ha (Shashidhar et al 2020).

Weed infestation is a major hindrance to urdbean output potential. Weeds cause losses of up to 50%-60% in urdbean during the rainy (Kharif) season, according to Yadav (1992). One-handed weeding at 20 and 40 DAS can suppress weeds, but labour is scarce (Bhowmik and Gupta, 2005). Herbicide weed control is cost-effective, but selecting the right herbicide and its efficacy is critical. To avoid yield loss, weed management strategies must be developed.

**MATERIALS AND METHODS**

Experiments were carried out at the Central Agricultural University (CAU) research farm between 2011 and 2012. The experimental field had a pH of 5.8 clay loamy soil with 0.78 percent organic carbon, 235 kilogramme N, 26.4 kg P2O5 and 324 kg K2O per ha. Weed data were collected at 30 and 45 DAS by randomly putting 50 cm × 50 cm quadrates in each plot. 30 and 45 DAS observations of crop plant height were also made (Bhowmik and Gupta, 2005). At harvest, seed yield (kg/ha) and its characteristics were recorded. To draw appropriate findings, Gomez and Gomez (1984) used statistics.

**RESULTS AND DISCUSSION**

The present study documented that C*. rotundus, E. colona, E. indica, C. dactylon, D. aegyptium, P. niruri, P. minima, Euphorbia sp., A. conyzoides* are major weeds in the experimental plots. Similar findings were recorded in several previous studies reports of Jakhar et al. (2015), Balyan et al. (2016) and Shashidhar et al. (2020), regarding weed flora’s existence in the plot.

Weed-free checks at 30 and 45 DAS showed significantly decreased weed density. Pre-emergent herbicide treatments had significantly lower weed density at 30 DAS than post-emergent herbicide treatments. Both 0.75 kg and 1.0 kg of pre-emergent herbicide pendimethalin 30 EC + Imazethapyr 2 EC were applied at 0.75 kg per ha (62.3 weeds/sq m). Hand weeding at 20 & 40 DAS (67 weeds/sq. m) at 30 DAS in blackgram. Pendimethalin (30%) + Imazethapyr (2%) 0.75 kg (40.0 g/sq.m) was comparable to manual weeding at 20 and 40 DAS (40.0 g/sq.m). WCE was highest with weed-free check (93%) and remaining treatment with pre-emergent herbicides.

WCE ranged from 42-69 percent for post-emergent herbicides at 30 45 DAS. The pendimethalin + imazethapyr treated plots had better weed control. Pre-emergent herbicides like pendimethalin + imazethapyr initially suppressed weed germination, but gradually evaporated and deactivated in the soil, boosting the following flush of weed.

In contrast, the post-emergent application of imazethapyr was successfully controlled the germinating weeds after 15 DAS and was able to control weeds. Even though the weed appeared, the growth and development of those weeds were inferior and uneven, which could not compete with the crop plant because of its vigorous development of the crop canopy. By removing the weed continuously for the first six weeks in the weed-free check, eliminating the maximum weeds, and the weeds rarely appeared after six weeks. This seems to be the spectacular reason which ensured significantly lesser weed density, dry weight and greater WCE.

The taller plants, more pods/plant, and more seeds/pod were noted with a weed-free inspection. The pre-emergent application of pendimethalin and imazethapyr (ready mix) applied plots were comparable (Table 3). The weed-free check had higher seed and stover yields than all other treatments (629.2 & 1807 kg/ha).

The maximum grain yield was reported by two weed-free tests (629.2 kg/ha) (Table 1). This resulted in weed control and a good grain production of black gramme (Rathi et al. 2004). The weed-free HW treatment offered great grain output for up to six weeks (Chand et al., 2004; Singh, 2011; Shashidhar et al., 2020). This treatment's grain production increased by 34% compared to weed-free check, two HW 20 and 40 DAS, uncontrolled weeds affected by 34%. This treatment also yielded 14% less than pendimethalin-only plots (Table 1 & 2).

Various herbicidal treatments assessed for efficacy in investigations were significant (Table 1& 2). The treatment differences and their impact on growth attributes were found to be closely connected to weed control. All treatments considerably enhanced crop growth attributes over weedy check plots at most stages. The weed-free check harvest treatment resulted in better plant height and pod yield (38.05 and 23.73 cm).

**Table 1.** Influence of herbicidal weed management on seed and stover yield

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Treatments | Seed yield (kg/ha) | | | Stover yield (kg/ha) | | |
| 2011 | 2012 | Pooled | 2011 | 2012 | Pooled |
| T1 : Weedy-check | 204 | 234 | 219.2 | 894 | 943 | 918.7 |
| T2 : HW at 20 & 40 DAS | 364 | 710 | 537.2 | 1441 | 2033 | 1737.2 |
| T3 : Pendimethalin 30% EC @ 1 kg/ha PE | 446 | 578 | 512.0 | 1348 | 1719 | 1533.5 |
| T4 : Quizalofop-ethyl @ 37.5 g/ha POE | 423 | 606 | 514.5 | 1343 | 1929 | 1635.8 |
| T5 : Fenoxyprop-p-ethyl-ethyl @ 50g/ha POE | 421 | 561 | 490.7 | 1321 | 1877 | 1599.2 |
| T6 : Pendimethalin 30% EC + Imazethapyr 2% EC @ 0.75kg/haPE | 376 | 623 | 499.8 | 1296 | 1884 | 1590.0 |
| T7 : Pendimethalin 30% EC + Imazethapyr 2% EC @ 1.0 kg/ha PE | 487 | 717 | 602.0 | 1414 | 2068 | 1741.0 |
| T8 : Imazathapyr 250 ml/ha POE 15 DAS | 414 | 661 | 537.5 | 1336 | 2024 | 1680.3 |
| T9 : Imazathapyr 400 ml/ha POE 15 DAS | 481 | 699 | 590.2 | 1419 | 1995 | 1706.8 |
| T10 : Imazathapyr 550 ml/ha POE 15 DAS | 501 | 701 | 600.8 | 1482 | 1907 | 1694.5 |
| T11 : Weed-free check | 510 | 749 | 629.2 | 1509 | 2105 | 1807.2 |
| SEM (±) | 14.9 | 24.9 | 17.4 | 29.1 | 60.6 | 33.5 |
| C.D.(P=0.05) | 43.8 | 73.5 | 51.2 | 85.8 | 178.9 | 99.0 |

**Table 2.** Influence of herbicidal weed management

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Treatments | Weed studies per m2 | | | | | |
| 30 DAS | | | At 45 DAS | | |
| Weed count | Weed dry wt | WCE (%) | Weed count | Weed dry wt | WCE (%) |
| T1 : Weedy-check | 357.9  (2.55) | 165.7  (2.23) | 0.0 | 336.7 (2.53) | 178.67  (2.25) | 0 |
| T2 : HW at 20 & 40 DAS | 67.0 (1.83) | 46.5  (1.67) | 72 | 67.0 (1.83) | 34.43  (1.55) | 81 |
| T3 : Pendimethalin 30% EC @ 1 kg/ha PE | 77.3 (1.89) | 49.1  (1.69) | 71 | 84.3 (1.93) | 40.49 (1.62) | 77 |
| T4 : Quizalofop-ethyl @ 37.5 g/ha POE | 106.4 (2.03) | 80.4  (1.91) | 52 | 106.4 (2.03) | 59.30 (1.78) | 66 |
| T5 : Fenoxyprop-p-ethyl-ethyl @ 50g/ha POE | 101.8 (2.01) | 77.6 (1.89) | 53 | 104.7 (2.02) | 56.35 (1.76) | 68 |
| T6 : Pendimethalin 30% EC + Imazethapyr 2% EC @ 0.75kg/ha as PE | 62.3 (1.80) | 40.0 (1.61) | 76 | 62.3 (1.80) | 31.26 (1.51) | 83 |
| T7 : Pendimethalin 30% EC + Imazethapyr 2% EC @ 1.0 kg/ha PE | 58.4 (1.76) | 46.7 (1.67) | 72 | 62.1 (1.79) | 32.51 (1.52) | 82 |
| T8 : Imazathapyr 250 ml/ha POE 15 DAS | 114.8 (2.06) | 97.0 (1.99) | 42 | 114.8 (2.06) | 65.30 (1.82) | 62 |
| T9 : Imazathapyr 400 ml/ha POE 15 DAS | 108.6 (2.04) | 86.9 (1.94) | 48 | 108.6 (2.04) | 61.02 (1.79) | 65 |
| T10 : Imazathapyr 5500 ml/ha POE 15 DAS | 97.4 (1.99) | 73.1 (1.87) | 56 | 97.4 (1.99) | 53.49 (1.73) | 69 |
| T11 : Weed-free check | 11.4 (1.09) | 11.5 (1.10) | 93 | 12.5 (1.13) | 10.07 (1.04) | 94 |
| SEM | 4.0 (0.02) | 2.2 (0.02) | 1.3 | 3.5 (0.02) | 1.79 (0.02) | 0.8 |
| C.D.(P=0.05) | 11.7 (0.06) | 6.5 (0.05) | 3.9 | 10.3 (0.05) | 5.28 (0.05) | 2.5 |

*Note: All the values are average of pooled data of year 2011 and 2012*

**Table 3**. Influence of herbicidal weed management on growth and yield attributes of blackgram

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Treatments | Plant height (cm) | No. of pods per plant | No. of seeds per pod | Weed Index (%) |
| T1 : Weedy-check | 26.35 | 15.08 | 5.68 | 64.3 |
| T2 : HW at 20 & 40 DAS | 31.47 | 20.03 | 6.40 | 16.6 |
| T3 : Pendimethalin 30% EC @ 1 kg/ha PE | 30.13 | 20.03 | 6.40 | 17.3 |
| T4 : Quizalofop-ethyl @ 37.5 g/ha POE | 29.63 | 19.97 | 6.23 | 17.8 |
| T5 : Fenoxyprop-p-ethyl-ethyl @ 50g/ha POE | 31.60 | 20.50 | 6.25 | 21.0 |
| T6 : Pendimethalin 30% EC + Imazethapyr 2% EC @ 0.75kg/ha as PE | 32.18 | 21.68 | 6.38 | 20.7 |
| T7 : Pendimethalin 30% EC + Imazethapyr 2% EC @ 1.0 kg/ha PE | 32.43 | 19.22 | 6.48 | 4.0 |
| T8 : Imazathapyr 250 ml/ha POE 15 DAS | 27.53 | 20.47 | 6.47 | 14.8 |
| T9 : Imazathapyr 400 ml/ha POE 15 DAS | 30.12 | 21.60 | 6.48 | 5.3 |
| T10 : Imazathapyr 5500 ml/ha POE 15 DAS | 32.20 | 21.77 | 6.17 | 3.6 |
| T11 : Weed-free check | 38.05 | 23.73 | 6.65 | 0.0 |
| SEM (±) | 0.67 | 0.26 | 0.07 | - |
| C.D.(P=0.05) | 1.97 | 0.76 | 0.20 | - |

*Note: All the values are average of pooled data of the year 2011 and 2012*

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